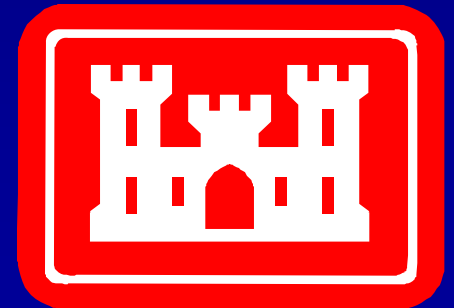


ENVIRONMENTAL WINDOWS: INFUSING SCIENCE OR STICKING WITH THE STATUS QUO?

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NATIONAL DREDGING TEAM MEETING
POINT CLEAR, ALABAMA 2009



Topics

- Windows and the precautionary principle
 - Risk assessment
- Windows and the National Research Council
- Windows outside the U.S.
- Virginia case study – anadromous fishes
- Barriers to infusion of science into windows

Environmental Window (Allowable Dredging Period)

- A management practice justified by the precautionary principle?
- A management practice designed to eliminate or minimize risk?
- An adaptive management practice?
- A management practice of first or last resort?

The Precautionary Principle

- *When an activity raises threats of harm to human health or the environment, **precautionary measures** should be taken even if some cause-and-effect relationships are not fully established scientifically.*

(from the 1998 Wingspread Statement)

The Precautionary Principle in Practice

- The PP is intended to be a risk-averse management practice
- According to the EC, precautions (*i.e. management practices*) are *preliminary* measures pending completion of risk assessment
- Precautions are *not an endpoint*, but a *starting point* in a search for alternatives
- “The litmus test for knowing when to apply the PP is the combination of threat of harm and scientific uncertainty” (Tickner, 1999)

THE PROPORTIONALITY RULE

- **The applied precaution (i.e. management practice) should be proportional to the degree of risk**
- **To apply a risk management approach acceptance of this rule is a prerequisite**

Status of
Findings and Recommendations
from the
NRC Committee Report
(Special Report 262, 2001)



Findings & Recommendations

- **Finding:** Dredging and disposal activities are only one of a number of human activities that affect the environment of the nation's waterways.
- **Recommendation:** They need to be evaluated within that context, and waterway decision-making must be broadly based to be successful.

Findings & Recommendations

- **Finding:** We know far more about the effects of dredging and disposal than many believe. A series of syntheses around a suite of questions not only would generate valuable information, but highlight areas where research is needed. We do too much repetitive research.
- **Recommendation:** All existing scientific data and information should be exploited in evaluating and setting windows as part of an overall management strategy for dredging and disposal operations.

Findings & Recommendations

- **Finding:** Environmental windows are one of a number of tools for reducing the environmental impacts of dredging and disposal operations and for increasing the efficiency and effectiveness of those operations.
- **Recommendation:** All tools, including windows, should be considered in designing a management plan for carrying out dredging and disposal operations to achieve project objectives.

Findings & Recommendations

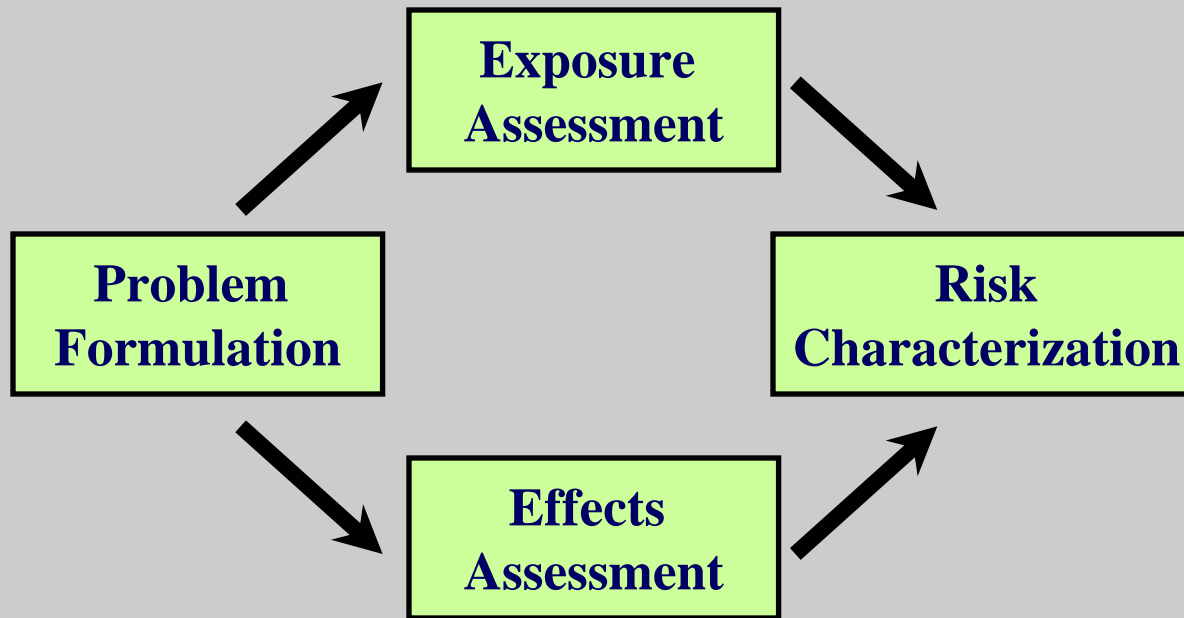
- **Finding:** The most difficult step in the process recommended is Step 4 - - Recommending a plan of action - - because it requires a balancing of scientific, economic, & societal considerations.
- **Recommendation:** Structured decision-making tools should be evaluated and the one or two most promising selected for additional testing, research and refinement for use in the recommended process.

Findings & Recommendations

- **Finding:** All windows should be viewed as subject to change on the basis of new data and information that should be incorporated routinely into the windows-setting process.
- **Recommendation:** The windows-setting process should reflect the principle of adaptive management. That is, as new data and information are acquired and experience is gained, they should be fed back into the process.

RISK FRAMEWORK

RISK ASSESSMENT PARADIGM



$$\text{Risk} = f(\text{Exposure} + \text{Effect})$$

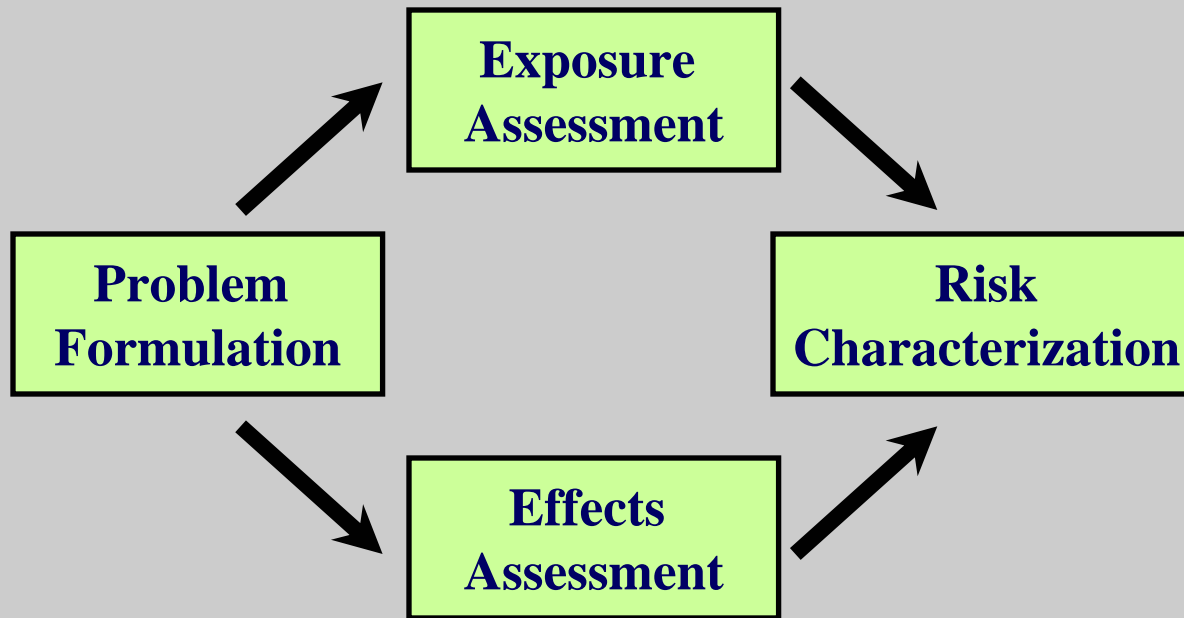
**Economic Analysis,
Socio-Political,
Engineering
Feasibility**

**Risk
Management**

**Management
Practices
(Precautions)**

Management Outside the Box

RISK ASSESSMENT PARADIGM



$$\text{Risk} = f(\text{Exposure} + \text{Effect})$$

**Risk
Management**

**Existing
Windows**

“BEST” Management Practice?

**DEPLOY SILT
CURTAIN**

**SLOW HOIST
SPEED**

**USE CLOSED
BUCKET**

**ENVIRONMENTAL
WINDOW**

PERCEIVED RISK



“BEST” Management Practice?

**ENVIRONMENTAL
WINDOW**

**DEPLOY SILT
CURTAIN**

**SLOW HOIST
SPEED**

**USE CLOSED
BUCKET**

PERCEIVED RISK



Management Practice Evaluation

PREFERRED

Environmental Window

Closed Bucket

REQUIRED LEVEL OF PROTECTION

LAST RESORT

*LEAST
UNDESIRABLE*

*Slow
Hoist
Speed*

Open Bucket

Silt Curtain

*MOST
UNDESIRABLE*

REASONABLE/AFFORDABLE

UNREASONABLE/UNAFFORDABLE

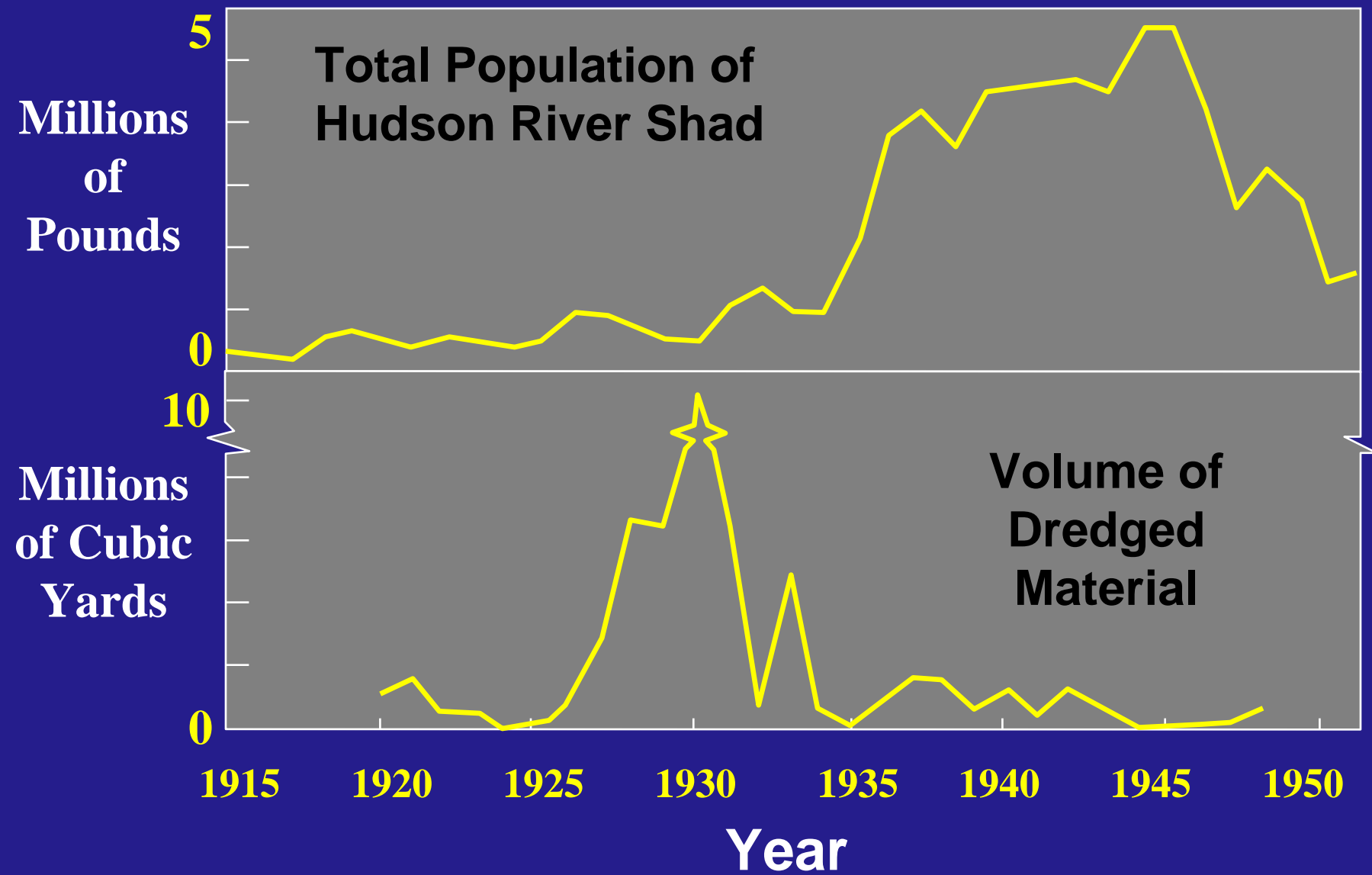
EFFECTIVENESS

EFFORT OR COST

JAMES RIVER AMERICAN SHAD

- Existing environmental window prohibits dredging during late winter-early spring
- Concerns focus on potential migratory blockage





From Talbot (1954)

- **Peer-reviewed**

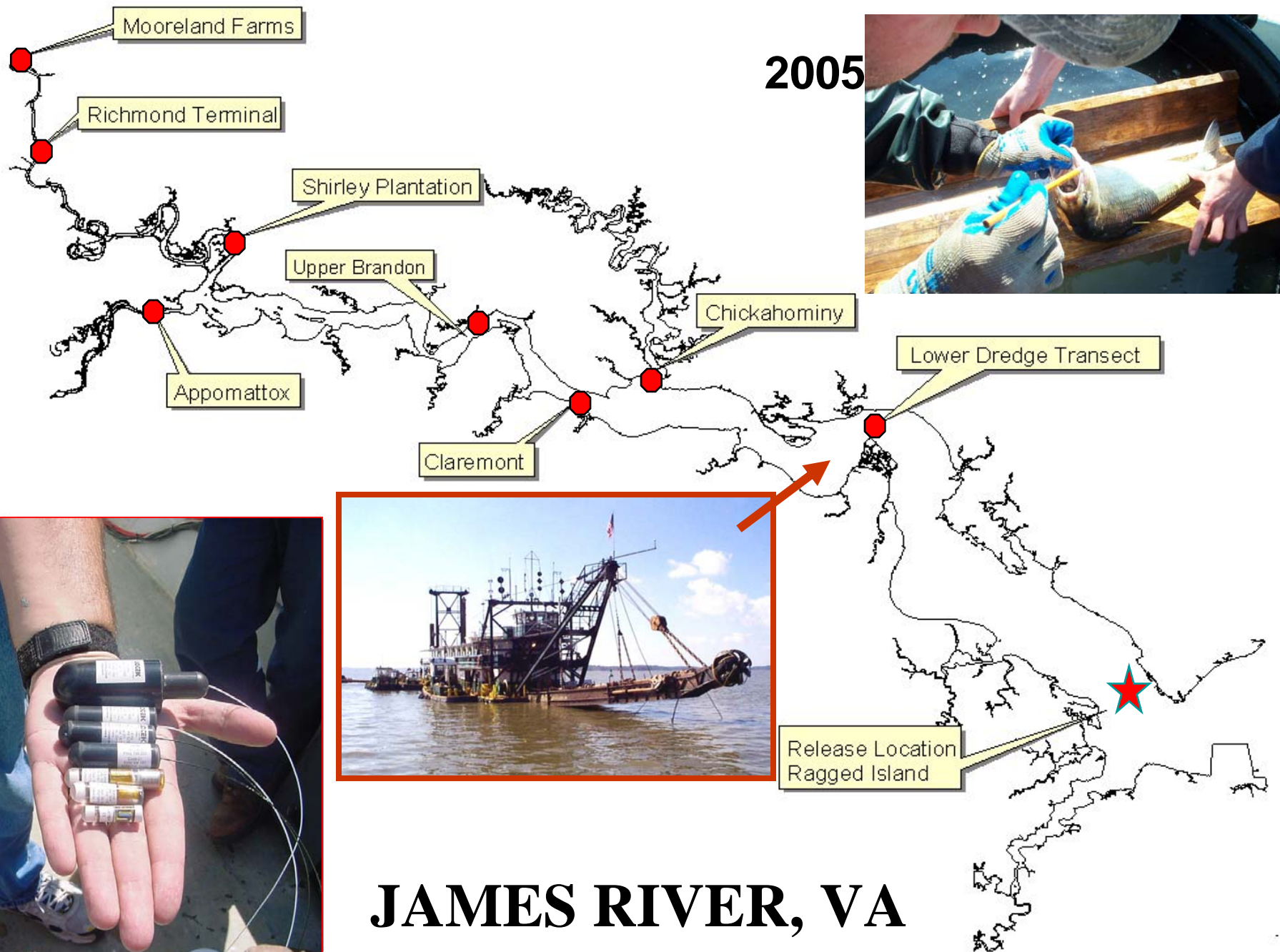
- **Talbot (1954) – Hudson River; No dredging effect.**

- **Polgar et al. (1985) – Potomac, Delaware, and Connecticut Rivers; No dredging effect.**

- **Rose and Summers – (1992) – Same rivers; No dredging effect.**

- **Unpublished**

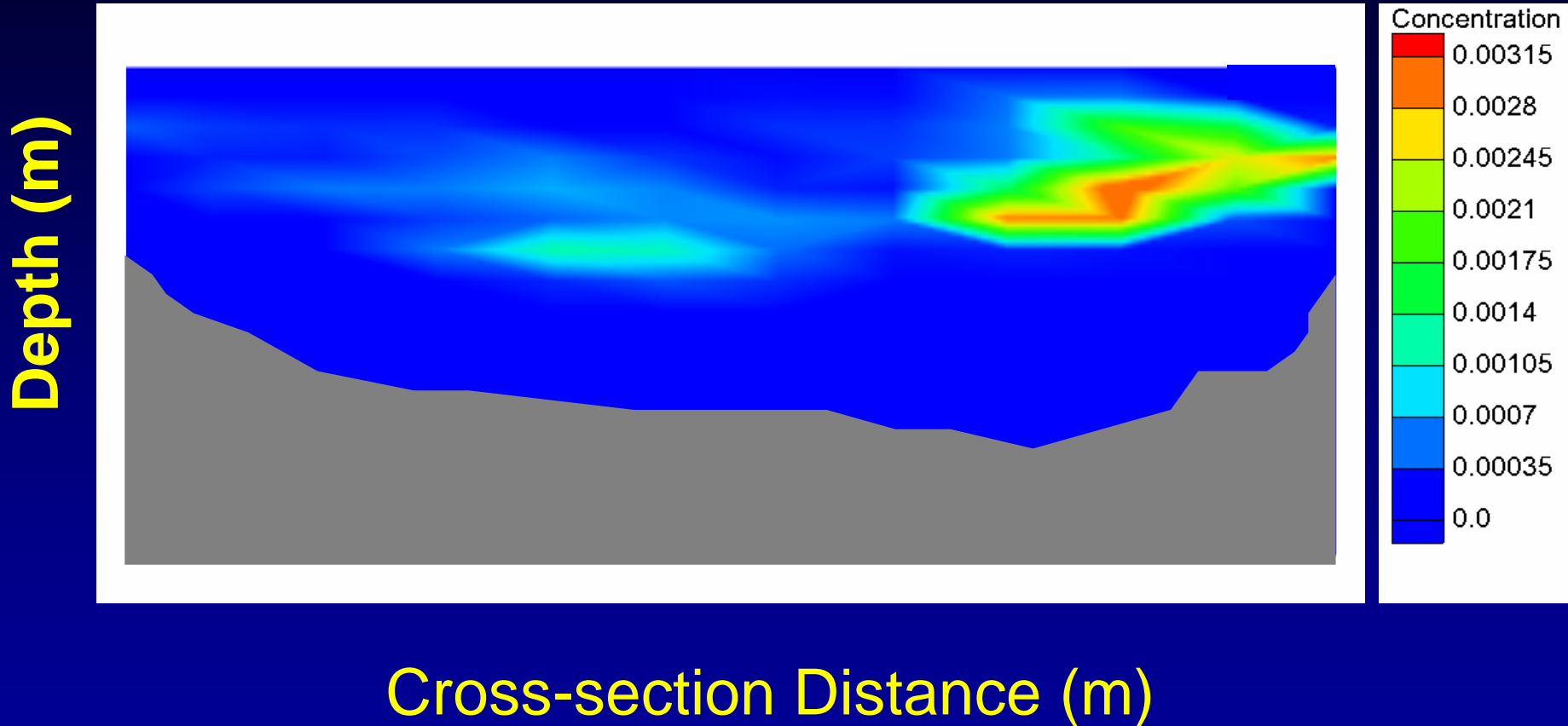
- **Gibson (1987) – Possible effect; Low recruitment during bucket dredging in confined waterway.**



James River, VA Dredging Study

- Interagency mtg - Oct 1998
- Interagency mtg - Jan 1999, Jul 1999
- DREDGE YES, FISH NO field demo - Sep 1999
- Interagency mtg - Feb 2000
- DREDGE NO, FISH YES field demo - Apr 2000
- VA Marine Resources Commission mtg – Aug 2000
- Interagency mtg – Jan 2001, Jun 2001
- Interagency mtg – Sep 2002
- York River fish tracking pilot study – Mar 2003
- Interagency mtg – Jul 2003
- James River fish tracking pilot study – Mar 2004
- Interagency mtg – Jul 2004
- VA Marine Resources Commission mtg – Sep 2004
- DREDGE YES, FISH YES field study – Apr 2005
- VA Marine Resources Commission – Aug 2006
- Today – The window remains unchanged. The Corps is reluctant to invest in additional studies.
- Tomorrow – New complications with listing of Atlantic sturgeon

Can the Risk of Exposure of Shad to Suspended Sediment Plumes be Characterized?

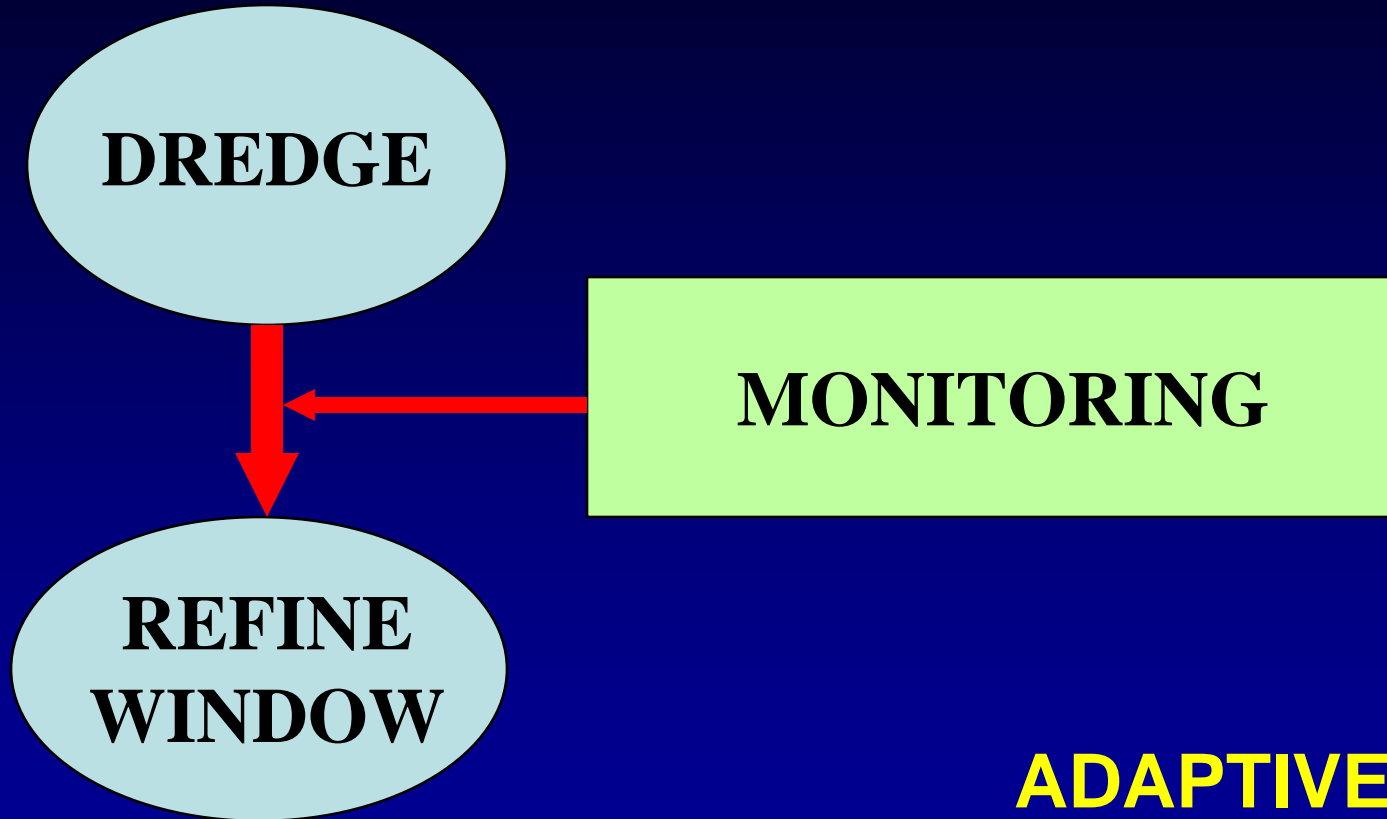


Barriers to Progress

- **Thresholds for acceptable risk are fuzzy or non-existent**
- **Often weak documentation of concerns**
- **Few resource agencies have staff dedicated entirely to the dredging process**
- **Resource agencies have limited funds for dredging-related research or training**
- **The Corps has limited R&D funding, and is reluctant to fund natural history studies**
- **Little incentive to change the status quo**

REQUIRED!!!

STEP 6



STEP 5

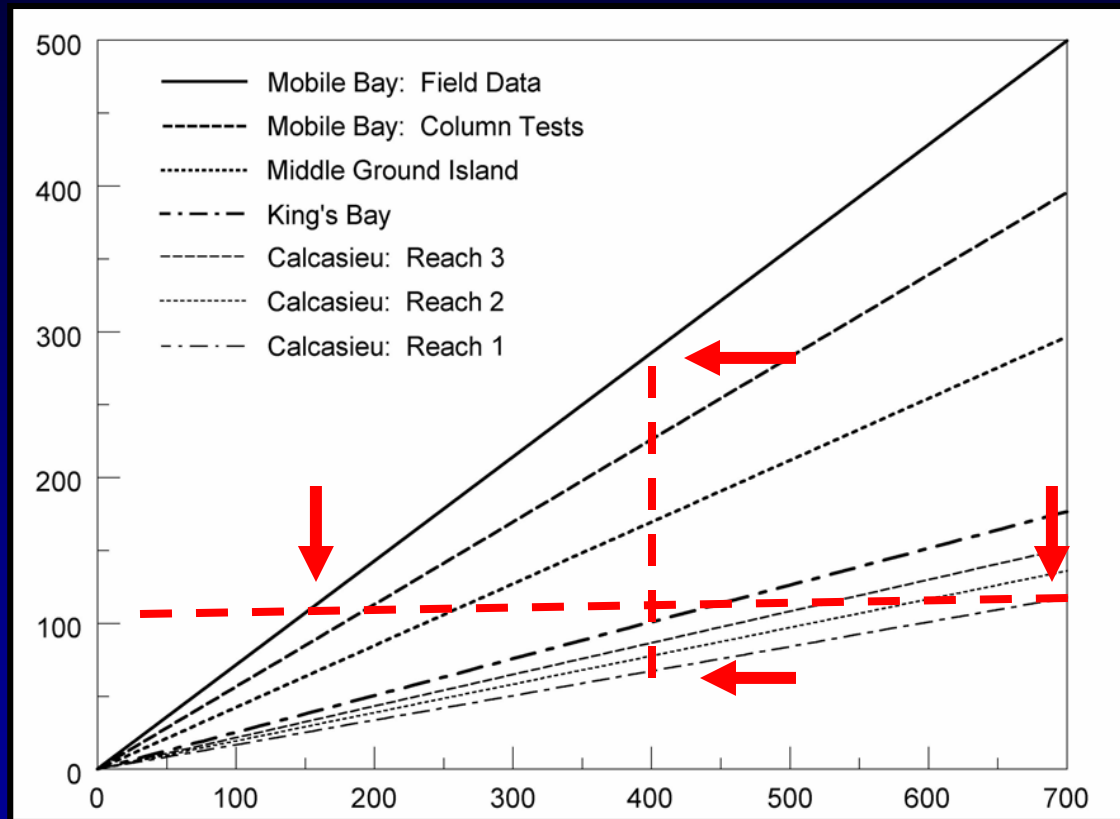
ADAPTIVE MANAGEMENT!!!

Monitoring Requirements

- **Compliance monitoring is generally non-adaptive**
 - **Case in point: TURBIDITY**
- **A shift to effects-based monitoring is essential**

Turbidity data are useful for protecting species only if the relationship between NTUs and TSS is established within the system being dredged.

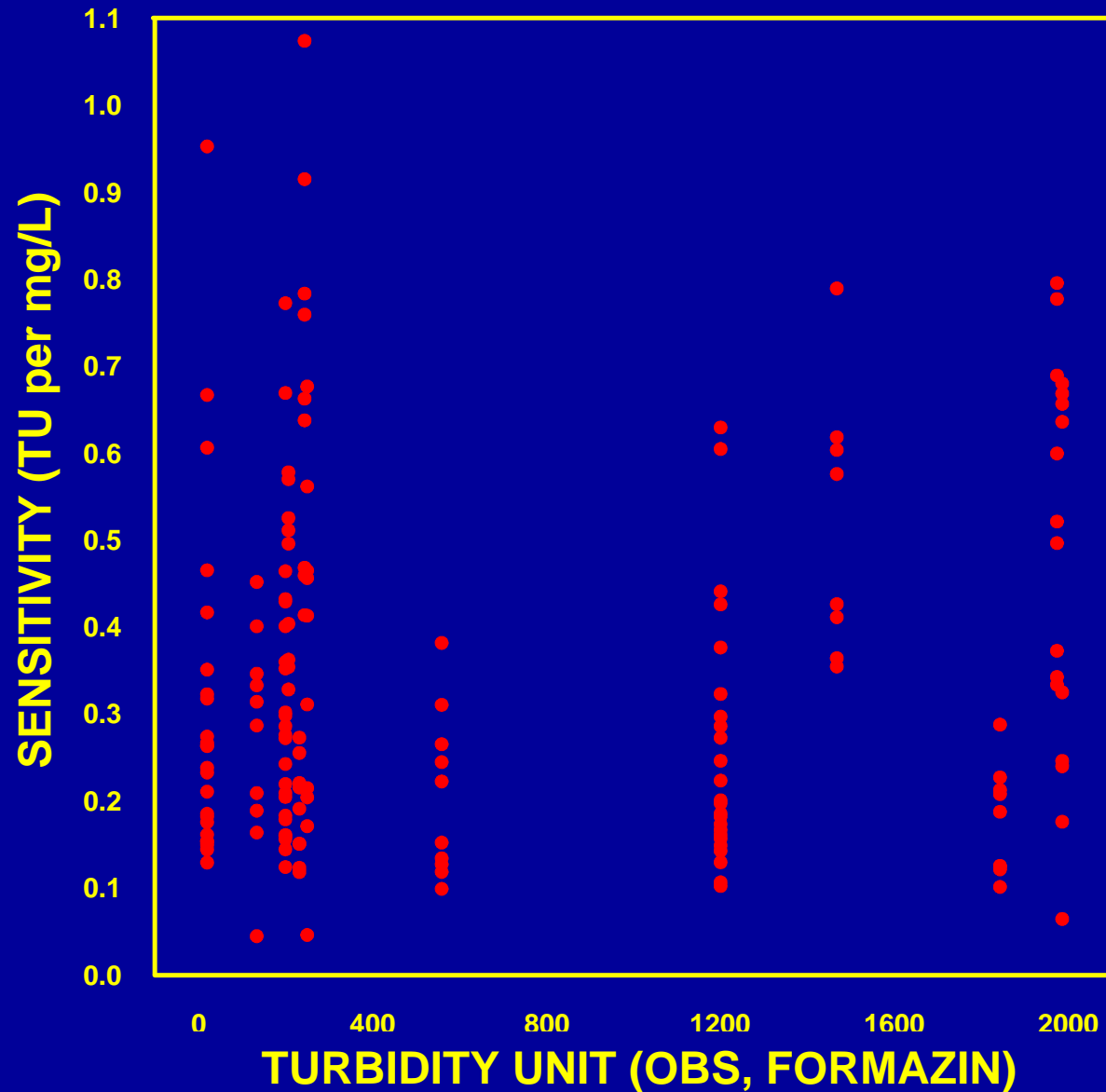
Turbidity (NTU)



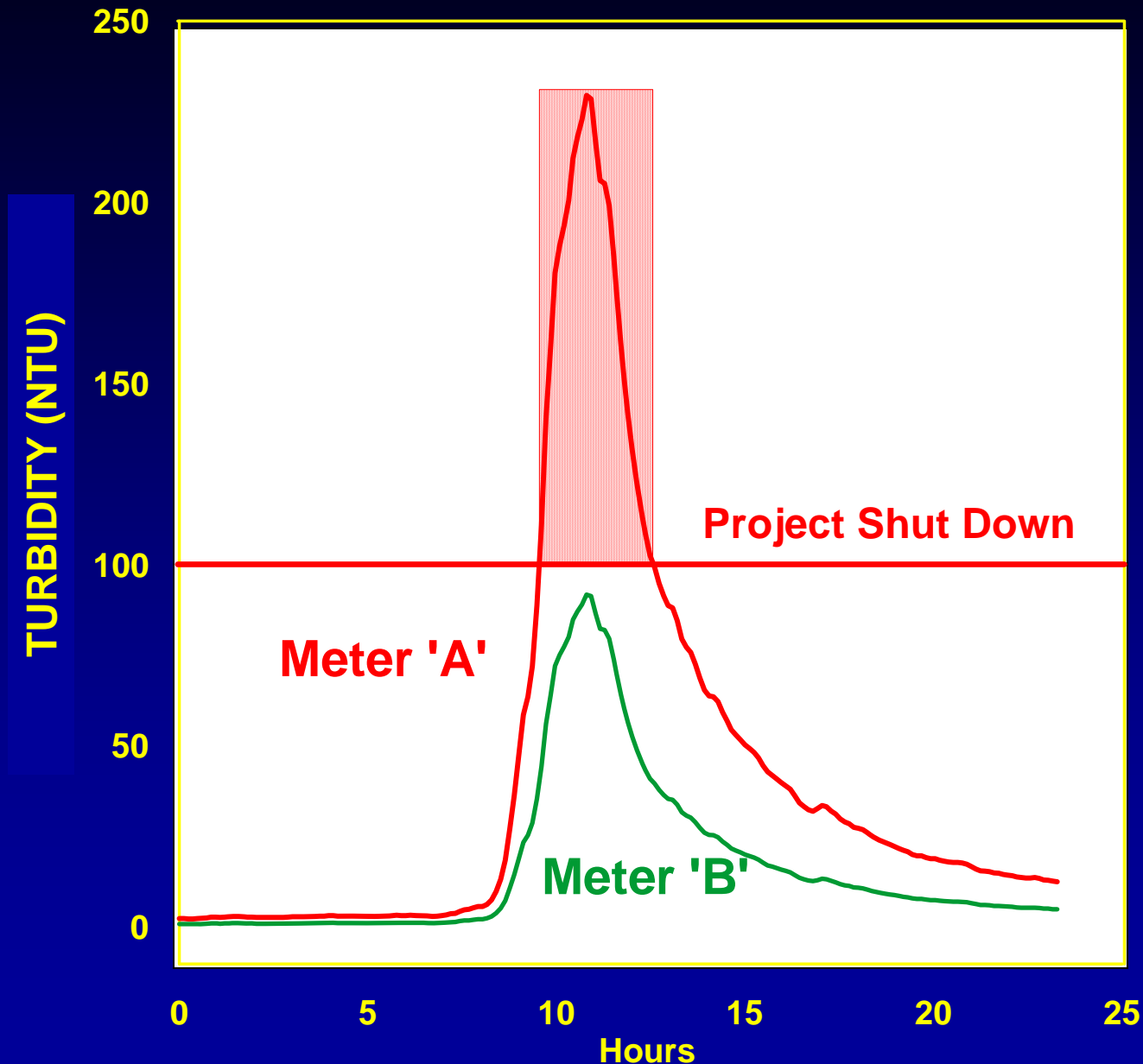
Example of different regression lines for different sediments

TSS concentration (mg/L)

Variability in Sensor Sensitivity is Problematic



Sensitivity is Extremely Important!



Final Thoughts

Implications of Different Modes of Dredging

- **Remedial/Clean-up Dredging**
- **Federal Navigation Dredging**
 - Maintenance dredging
 - New work dredging
- **Permit Dredging**

Final Thoughts

- **In many dredging scenarios the risk associated with dredging clean sediments does not appear to be great**
- **Strict adherence to environmental windows for over three decades has stagnated science and stifled the pursuit of improved engineering solutions**
- **Such knowledge could contribute to accurate assessments of risk, and to more effective resource protection measures**

The End

QUESTIONS?